WHAT IS CLAIMED IS:

1. A method of forming a thin-film fuel cell electrode, comprising: providing a substrate and at least one deposition device;

developing a deposition characteristic profile having at least one porous layer based on pre-determined desired electrode properties; and

forming a film in accordance with said deposition characteristic profile by depositing material from said deposition device while varying a relative position of said substrate in relation to said deposition device with respect to at least a first axis.

- 2. The method of claim 1, wherein forming said film further comprises varying a power supplied to said deposition device.
- 3. The method of claim 1, wherein forming said film further comprises varying a bias of said substrate to a deposited material.
- 5. The method of claim 1, wherein forming said film further comprises varying an applied magnetic field.
- 6. The method of claim 1, wherein varying said relative position comprises advancing said substrate along a substrate advancement path.
- 7. The method of claim 1, wherein varying said relative position comprises varying a speed with which said substrate passes said deposition device.
- 8. The method of claim 1, wherein varying said relative position comprises varying a distance at which said substrate passes said deposition device.
- 9. The method of claim 8, wherein varying said relative position further comprises varying a speed with which said substrate passes said deposition device.

- 10. The method of claim 1, wherein varying said relative position comprises traversing said substrate back and forth past said deposition device.
- 11. The method of claim 10, wherein varying said relative position further comprises varying a distance in multiple directions.
- 12. The method of claim 11, wherein varying said relative position further comprises varying a speed with which said substrate passes said deposition device.
- 13. The method of claim 12, wherein said deposition characteristic profile comprises at least composition gradient profile and at least one morphological gradient profile.
- 14. The method of claim 13, wherein said morphological profile comprises alternating dense film layers and porous film layers having nano-chambers.
 - 15. The method of claim 14, wherein said deposition device comprises a sputter gun.
- 16. The method of claim 1, further comprising providing a second deposition device and depositing a second material from said second device onto said substrate while varying the relative position of said substrate in relation to said second deposition device with respect to at least a first axis.
- 17. The method of claim 16, wherein forming said film further comprises varying a power supplied to said deposition device.
- 18. The method of claim 16, wherein forming said film further comprises varying a bias of said substrate to a deposited material.
- 19. The method of claim 16, further comprising varying a distance between said deposition devices.

- 20. The method of claim 16, wherein forming said film further comprises varying an applied magnetic field.
- 21. The method of claim 16, wherein varying said relative position comprises advancing said substrate along a substrate advancement path.
- 22. The method of claim 16, wherein varying said relative position comprises varying a speed with which said substrate passes said deposition device.
- 23. The method of claim 16, wherein varying said relative position comprises varying a distance between said deposition devices.
- 24. The method of claim 23, wherein varying said relative position further comprises introducing the use of shutter to selectively block at least a portion of a material expelled from at least one of said deposition devices.
- 25. The method of claim 16, wherein varying said relative position comprises traversing said substrate back and forth past said deposition device.
- 26. The method of claim 25, wherein varying said relative position further comprises varying a distance in multiple directions.
- 27. The method of claim 26, wherein varying said relative position further comprises varying a speed with which said substrate passes said deposition device.
- 28. The method of claim 27, wherein said deposition characteristic profile comprises at least composition gradient profile and at least one morphological gradient profile.
- 29. The method of claim 28, wherein morphological profile comprises alternating dense film layers and porous film layers having nano-chambers.

- 30. The method of claim 29, wherein said deposition devices comprise sputter guns.
- 31. The method of claim 16, further comprising varying the distance between said deposition devices.
- 32. The method of claim 16, wherein forming said film comprises introducing the use of second and third deposition devices.
- 33. The method of claim 32, wherein forming said film comprises varying a speed with which said substrate passes said deposition devices.
- 34. The method of claim 33, wherein forming said film comprises varying a substrate advancement path of said substrate with respect to said deposition devices.
 - 35. The method of claim 1, wherein said electrode comprises an anode.
- 36. The method of claim 35, wherein said anode is formed from a group consisting of nickel, platinum, Ni-YSZ, Cu-YSZ, Ni-SDC, Ni-GDC, Cu-SDC, Cu-GDC.
 - 37. The method of claim 1, wherein said electrode comprises a cathode.
- 38. The method of claim 37, wherein said cathode is formed from a group consisting of silver, platinum, samarium strontium cobalt oxide (SSCO, Sm_xSr_yCoO_{3-δ}), barium lanthanum cobalt oxide (BLCO, Ba_xLa_yCoO_{3-δ}), gadolinium strontium cobalt oxide (GSCO, Gd_xSr_yCoO_{3-δ}), lanthanum strontium manganite (La_xSr_yMnO_{3-δ}) and lanthanum strontium cobalt ferrite (La_wSr_xCo_yFe_zO_{3-δ}) and mixtures thereof.
- 39. A thin-film fuel cell electrode formed by: providing a substrate and at least one deposition device; developing a deposition characteristic profile based on pre-determined desired electrode properties; and

forming a compositionally-graded film in accordance with said deposition characteristic profile by sputtering material from said deposition device while varying a relative position of said substrate in relation to said deposition device with respect to at least a first axis.

- 40. The electrode of claim 39, further comprising providing a second deposition device and sputtering a second material from said second device onto said substrate while varying the relative position of said substrate in relation to said second deposition device with respect to at least a first axis.
- 41. The electrode of claim 39, wherein forming said film further comprises varying a power supplied to said deposition device.
- 42. The method of claim 39, wherein forming said film further comprises varying a bias of said substrate to a deposited material.
- 43. The method of claim 39, wherein forming said film further comprises varying an applied magnetic field.
- 44. The method of claim 39, wherein varying said relative position comprises advancing said substrate along a substrate advancement path.
- 45. The method of claim 39, wherein varying said relative position comprises varying a speed with which said substrate passes said deposition device.
- 46. The method of claim 40, wherein varying said relative position comprises varying a distance between said deposition devices.
- 47. The method of claim 46, wherein varying said relative position further comprises varying a speed with which said substrate passes said deposition device.

- 48. The method of claim 40, wherein varying said relative position comprises traversing said substrate back and forth past said deposition device.
- 49. The method of claim 48, wherein varying said relative position further comprises varying a distance in multiple directions.
- 50. The method of claim 49, wherein varying said relative position further comprises varying a speed with which said substrate passes said deposition device.
- 51. The method of claim 50, wherein said deposition characteristic profile comprises at least composition gradient profile and at least one morphological gradient profile.
- 52. The method of claim 51, wherein morphological profile comprises alternating dense film layers and porous film layers.
 - 53. The method of claim 52, wherein said porous film layers comprise nano-chambers.
- 54. The method of claim 40, further comprising varying the distance between said deposition devices.
- 55. The method of claim 40, wherein forming said film comprises introducing the use of second and third deposition devices.
- 56. The method of claim 55, wherein forming said film comprises varying a speed with which said substrate passes said deposition devices.
- 57. The method of claim 56, wherein forming said film comprises varying a substrate advancement path of said substrate with respect to said deposition devices.
 - 58. The method of claim 39, wherein said electrode comprises an anode.

- 59. The method of claim 58, wherein said anode is formed from a group consisting of nickel, platinum, Ni-YSZ, Cu-YSZ, Ni-SDC, Ni-GDC, Cu-SDC, Cu-GDC.
 - 60. The method of claim 1, wherein said electrode comprises a cathode.
- 61. The method of claim 60, wherein said cathode is formed from a group consisting of silver, platinum, samarium strontium cobalt oxide (SSCO, Sm_xSr_yCoO_{3-δ}), barium lanthanum cobalt oxide (BLCO, Ba_xLa_yCoO_{3-δ}), gadolinium strontium cobalt oxide (GSCO, Gd_xSr_yCoO_{3-δ}), lanthanum strontium manganite (La_xSr_yMnO_{3-δ}) and lanthanum strontium cobalt ferrite (La_wSr_xCo_yFe_zO_{3-δ}) and mixtures thereof.
 - 62. A system for forming thin-films, comprising: means for variably advancing a substrate; at least one means for variably depositing material on said substrate; and means for forming at least one layer having nano-chambers.
- 63. The system of claim 62, further comprising means for forming a compositional gradient on said substrate.
- 64. The system of claim 63, further comprising means for forming a morphological gradient on said substrate.
- 65. The system of claim 64, further comprising means for forming nano-pores in said morphological gradient.
 - 66. A fuel cell, comprising:

an electrolyte located between thin film electrodes having at least one porous layer and the porous layers are of a thickness of between 10-500 nanometers.

67. The fuel cell of claim 66, wherein said porous layers are between 30-80 nanometers in thickness.